Express Mail Label
No. EL416124278US

# U.S. UTILITY PATENT APPLICATION BY

## Robert Geyer & Anthony Hamline

## Entitled

# CYLINDRICAL BRUSH IDLER-SIDE TAPER ADJUSTMENT ASSEMBLY

::ODMA\PCDOCS\LIB1\672496\1

We claim the following:

1. An adjustable assembly for a powered rotating brush member operating in a surface maintenance vehicle, comprising:

a brush assembly housing member having a first aperture and a second aperture formed therein in spaced apart relation and a cam-receiving location on a first side thereof; and,

a substantially cylindrical brush member having an axis of rotation and a first rotary attachment location at a first end at said axis of rotation and having a second rotary attachment location at a second end and at least one of said first end and second end is connected via a coupling mechanism to the brush assembly housing member;

wherein said coupling mechanism further comprises a pivotable cam member having a threaded bore of diameter approximately equal to a diameter of said first aperture of the brush assembly housing member extending from a first side of the pivotable cam member to an interior portion of the pivotable cam member and an adjustment head member spaced from the threaded bore so that when the bore and the first aperture are aligned on the first side of said brush assembly housing member, a threaded connecting member having an enlarged head may be inserted from a second side of the brush assembly housing member through the first aperture and into the bore to thereby connect and couple the pivotable member to the brush assembly housing member so that the adjustment head member protrudes through the second aperture and a second side opposite the first side of said pivotable cam member engages a first ring portion of a rotary bearing assembly and a second ring portion of said rotary bearing assembly engages the substantially cylindrical brush member.

2. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein said rotary bearing assembly further comprises a second ring portion spaced from the first ring portion and said second ring

portion is coupled to the substantially cylindrical brush member and wherein a material designed to reduce friction between said first ring portion and said second ring portion is disposed in the space between said first ring portion and second ring portion.

3. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, further comprising an extension member mechanically coupled to the pivotable cam member on a first side of the extension member and wherein a second side of said extension member engages said first ring portion.

4. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein said brush assembly housing member further comprises a removable cover portion mechanically connected to said housing.

5. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein said pivotable cam member is a first and a second interlocking member and said bore extends through the first interlocking member and into a threaded blind hole disposed in said second interlocking member and further comprising a ridge member formed adjacent the threaded blind hole and protruding from the second interlocking member which engages a corresponding elongate recess formed in the first interlocking member to inhibit motion therebetween.

6. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 5, wherein the ridge member is formed as at least one pin member and the elongate recess is formed to correspond to the at least one pin.

7. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein the adjustment head is a separate piece from

said pivotable cam member and is suitable bonded into a port formed in said pivotable cam member.

8. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein the pivotable cam member is fabricated of at least one of the following materials: metal, powdered metal, ceramic, composite, resin-based, and any of the above further comprising fiber-impregnation or heat tempering and wherein the pivotable cam member is fabricated by any one or more of the following: cast, milled, molded, sculpted or etched into appropriate shape.

9. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein the first aperture is substantially round and the second aperture is substantially elongate in shape.

10. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 1, wherein:

a power source for rotating said substantially cylindrical brush member is a select one of the following:

an electrical motor

an internal combustion motor,

a pneumatic motor, or,

a hydraulic motor; and

wherein the power source is coupled to the substantially cylindrical brush member via a select one of the following:

a direct drive coupling from said power source,

a reduction gear coupled by a continuous belt to a drive gear which couples to the power source,

a linear actuator,

a leadscrew,

a continuous cable, or,

a belt member coupled to the power source which propels the surface maintenance vehicle.

11. An adjustable assembly for a rotating brush member operating in a surface maintenance according to claim 10, wherein the location the power source is coupled to the substantially cylindrical brush member is a select one of the following:

at a first end of said substantially cylindrical brush member;

at a second end of said substantially cylindrical brush member; and,

at a discrete location between said first end and said second end of said substantially cylindrical brush member.

12. An adjustable assembly for one of a pair of counter-rotating brush members operating in a surface maintenance vehicle, comprising:

a housing member having a first aperture and a second aperture, spaced from the first aperture, wherein said second aperture has an elongate shape;

a substantially cylindrical first brush member having a first attachment location disposed at a first end and having a second attachment location disposed at a second end and each of said first end and second end rotatably coupled to the housing member;

a substantially cylindrical second brush member, closely spaced from the substantially cylindrical first brush member, having a first attachment location disposed at a first end and having a second attachment location disposed at a second end and each of said first end and second end rotatably coupled to the housing member;

a first cam member pivotably coupled to the housing member at the first attachment location, wherein the first cam member has an adjustment head protruding from a first side which emerges from first aperture of the housing member and a bore spaced from the adjustment head and a ridge-receiving elongate recess formed on a second side;

a second cam member mechanically coupled to the second side of the first cam member on a first side of the second cam member and wherein the first side of the second cam member has a threaded blind hole formed therein aligned with the first aperture of the housing member and a ridge feature formed thereon corresponding to said ridge-receiving elongate recess and a second side of said second cam member engages an first ring portion of a bearing assembly, wherein the bearing assembly has an outer ring portion coupled to the rotational axis of the substantially cylindrical brush member;

wherein said first aperture is adapted to receive the adjustable head member and said second aperture is adapted to receive an elongate shank member having an enlarged head and wherein the elongate shank member provides mechanical engagement between the first cam member and the second cam member.

13. An adjustable assembly according to claim 12, further comprising a motive force mechanically coupled to the second attachment location of the substantially cylindrical brush member for driving said brush member at a changing rate of rotation.

14. An adjustable assembly according to claim 13, wherein said motive force provides an adjustable magnitude output force so that when said motive force is increased the substantially cylindrical brush member rotates more rapidly and when said motive force is decreased the substantially cylindrical brush member rotates less rapidly.

15. An adjustable assembly according to claim 13, further comprising a first and a second substantially cylindrical brush member coupled to the housing and disposed

with substantially parallel axes of counter-rotation and spaced apart with each contacting a surface to be cleaned such that said first and said second substantially cylindrical brush members cooperate together to urge particles and debris present on said surface to be cleaned away from said surface.

16. An adjustable assembly according to claim 15, further comprising a debris capture vessel configured to temporarily collect said particles and debris.

17. An adjustable assembly according to claim 13, wherein said motive force is an electrical motor coupled to the second attachment location via at least one belt member driving a first driven gear member and via a second driven gear member which is coupled to the rotational axis of the substantially cylindrical brush member.

18. An adjustable assembly according to claim 15, further comprising a second motive force coupled to the second substantially cylindrical brush member for driving said second substantially cylindrical brush member in a direction of rotation opposite the direction of rotation of said first substantially cylindrical brush member.

19. An adjustable assembly according to claim 12, wherein said first cam member further comprises a pin-receiving recess formed in one of said major surfaces of the first cam member; and,

wherein the second cam member further comprises a pin formed on said first side corresponding to said pin-receiving recess of the first cam member.

20. A method of adjusting the spacing between the bristles of a powered rotary brush and a surface to be brushed without uncoupling a rotational coupling or a power

mechanism for said rotary brush disposed at said first end from a fully coupled state, comprising the steps of:

releasing a coupling force at a first end of a powered rotary brush assembly;

repositioning said first end; and,

increasing the coupling force at the first end.

21. A method according to claim 20, wherein releasing the coupling force further comprises the step of manually applying a tool having a structure receiving aperture to a corresponding structure mechanically coupled to produce said coupling force at the first end of the rotary brush assembly.

22. A method according to claim 20, wherein repositioning said first end further comprises the step of manipulating said rotary brush assembly to increase or decrease the spacing of said rotary brush assembly relative to a surface.

23. A method according to claim 20, wherein increasing said coupling force at said first end further comprises the step of manually applying a tool having a structure receiving aperture to a corresponding structure mechanically coupled to produce said coupling force at the first end of the rotary brush assembly.

24. A method according to claim 22, further comprising the step of measuring the spacing between the bristles of the powered rotary brush and the surface to confirm an effective increase or decrease in said spacing relative to said surface.

25. A method according to claim 22, wherein the repositioning step further comprises the step of referencing an indicia of relative spacing between said first end of the rotary brush assembly, wherein said indicia appears adjacent said first end.

26. A method according to claim 25, wherein said indicia further comprises corresponding indicia for said first end and a corresponding indicia disposed on a non-adjustable structure disposed adjacent said first end.

27. A method according to claim 20, further comprising a second powered rotary brush assembly disposed adjacent the powered rotary brush and, in addition to performing the steps set forth at claim 1, further comprising the steps of:

releasing a coupling force at a first end of a second powered rotary brush assembly;

repositioning said first end of the second powered rotary brush assembly; and,

increasing the coupling force at the first end of the second powered rotary brush assembly.

28. A method according to claim 20, wherein releasing the coupling force further comprises the step of manually reducing said coupling force at the first end of the rotary brush assembly.

29. A method according to claim 20, wherein repositioning said first end further comprises the step of manipulating said rotary brush assembly to increase or decrease the spacing of said rotary brush assembly relative to a surface by sliding a first one of a pair of interlocking structures to permit a linear displacement of said first end relative to the surface.

30. A method according to claim 29, wherein the first one of said pair of interlocking structures further comprise a first linear channel member formed at the first end; and

a first pin member corresponding to and mechanically cooperating with said first linear channel member when received by said first linear channel member.

31. An adjustable assembly, comprising:

an elongate rotary brush member having a longitudinal axis of rotation;

a first rotational mounting structure coupled to the elongate rotary brush member at the longitudinal axis at a first end of the elongate rotary brush member and a second rotational mounting structure coupled to the elongate rotary brush member at the longitudinal axis at a first end of the elongate rotary brush member so that said elongate rotary brush member freely rotates about said longitudinal axis;

an adjustable mechanism disposed adjacent but spaced from the first rotational mounting structure; and,

a source of rotational motion coupled to the second end of the elongate rotary brush;

wherein said adjustable mechanism has a pivot head member disposed at a pivot axis of said adjustable mechanism and the adjustable mechanism pivots on the axis between a partially-released state and a fully-coupled state when the pivot head member pivots about the pivot axis, and,

(i) in the event that the adjustable release mechanism is in the partially-released state said first rotational mounting structure may translate while the elongate rotary brush member remains coupled to said first rotational mounting structure and said second rotational mounting structure, and,

(ii) in the event that the adjustable release mechanism is in the fully-coupled state said first rotational mounting structure may not translate.